

AMENDMENT TO THE CLAIMS

The following is a detailed listing of all claims that are, or were, in the Application.

1-12. (Canceled)

2 ~~13~~. (Currently amended) The apparatus of Claim ~~12~~18 wherein a signal region is defined with reference to a predetermined voltage.

3 ~~14~~. (Currently amended) The apparatus of Claim ~~13~~18 wherein a signal transition is defined by a change in signal level.

4 ~~15~~. (Currently amended) The apparatus of Claim ~~12~~18 wherein a signal transition can be either a rise or a fall in signal level.

16. (Canceled)

5 ~~17~~. (Currently amended) The apparatus of Claim ~~16~~18 wherein the transition detector is operable to sample each of the pair of differential signals at least twice for each symbol.

6 ~~18~~. (Currently amended) ~~The apparatus of Claim 16~~ An apparatus for recovering data from multi-symbol signaling comprising:

a pre-amplifier operable to receive a carrier signal conveying a plurality of symbols, each symbol uniquely defined by a signal transition and a signal region in the carrier signal, each symbol representing a plurality of data, wherein the pre-amplifier is operable to generate a pair of differential signals for the carrier signal;

a region detector coupled to the pre-amplifier and operable to determine the defining signal region for each symbol; and

a transition detector coupled to said pre-amplifier and operable to determine the defining signal transition for each symbol, wherein the transition detector comprises a differencing circuit operable to store a first value for each of the pair of differential signals in a first time period and a second value for each of the pair of differential signals in a second time period.

19. (Previously presented) The apparatus of Claim 18 wherein the transition detector comprises a differential latch amplifier coupled to the differencing circuit, the differential latch amplifier operable to receive the stored first and second values for each of the pair of differential signals, the differential latch amplifier operable to differentially amplify a first node and a second node in response to the received first and second values.

20. (Currently amended) The apparatus of Claim ~~16~~18 wherein the region detector is operable to take an average value for each of the pair of differential signals for each symbol.

21. (Currently amended) ~~The apparatus of Claim 16~~ An apparatus for recovering data from multi-symbol signaling comprising:

a pre-amplifier operable to receive a carrier signal conveying a plurality of symbols, each symbol uniquely defined by a signal transition and a signal region in the carrier signal, each symbol representing a plurality of data, wherein the pre-amplifier is operable to generate a pair of differential signals for the carrier signal;

a region detector coupled to the pre-amplifier and operable to determine the defining signal region for each symbol, wherein the region detector comprises an averaging circuit operable to store a first value for each of the pair of differential signals in a first time period and a second value for each of the pair of differential signals in a second time period, the averaging circuit operable to provide a first average value of the stored first and second values for one of the pair of differential signals and to provide a second average value of the stored first and second values for the other of the pair of differential signals; and

a transition detector coupled to said pre-amplifier and operable to determine the defining signal transition for each symbol.

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22. (Previously presented) The apparatus of Claim 21 wherein the region detector comprises a differential latch amplifier coupled to the averaging circuit, the differential latch amplifier operable to receive the first average value and the second average value, the differential latch amplifier operable to differentially amplify a first node and a second in response to the received first and second average values.

23-35. (Canceled)

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36. (Currently amended) The receiver of Claim 3540, wherein said at least one region detector further comprises a first region detector to process data corresponding to odd-numbered clock cycles and a second region detector to process data corresponding to even-numbered clock cycles; and

wherein said at least one transition detector further comprises a first transition detector to process data corresponding to odd-numbered clock cycles and a second transition detector to process data corresponding to even-numbered clock cycles.

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37. (Currently amended) The receiver of Claim 3540, wherein said pre-amplifier is further operable to receive a predetermined voltage indicating characteristics of a transmission channel through which said symbol stream was transmitted.

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38. (Currently amended) The receiver of Claim 3540, wherein said pre-amplifier is further operable to receive a bias voltage which biases said pre-amplifier in a saturation region to ensure linear operation.

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39. (Currently amended) The receiver of Claim 35~~40~~, wherein said bias voltage is process, voltage, and temperature compensated.

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40. (Currently amended) ~~The receiver of Claim 35;~~ A receiver comprising:
a pre-amplifier operable to receive a symbol stream and generate a differential output, wherein the symbol stream comprises a plurality of symbols with each symbol uniquely defined by a signal transition and a signal region in a carrier signal, each symbol representing a plurality of data;

at least one region detector coupled to said pre-amplifier and operable to detect and output at least one bit from said differential output; and

at least one transition detector coupled to said pre-amplifier and operable to detect and output at least one other bit from said differential output;

wherein said at least one region detector comprises:

an averaging circuit coupled to said pre-amplifier;

a differential latch amplifier coupled to said averaging circuit; and

a hold circuit coupled to said differential latch amplifier.

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41. (Currently amended) ~~The receiver of Claim 35;~~ A receiver comprising:
a pre-amplifier operable to receive a symbol stream and generate a differential output, wherein the symbol stream comprises a plurality of symbols with each symbol uniquely defined by a signal transition and a signal region in a carrier signal, each symbol representing a plurality of data;

at least one region detector coupled to said pre-amplifier and operable to detect and output at least one bit from said differential output; and

at least one transition detector coupled to said pre-amplifier and operable to detect and output at least one other bit from said differential output;

wherein said at least one transition detector comprises:

a differencing circuit coupled to said pre-amplifier;

a differential latch amplifier coupled to said differencing circuit; and

a hold circuit coupled to said differential latch amplifier.

42-44. (Canceled)

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45. (Currently amended) ~~The method of Claim 42,~~ A method for processing transmitted symbols comprising:

receiving a symbol stream and generating a differential output, wherein the symbol stream comprises a plurality of symbols with each symbol uniquely defined by a signal transition and a signal region in a carrier signal, each symbol representing a plurality of data;

determining at least one bit from said differential output by detecting whether a portion of said symbol stream is within a defining voltage region; and

determining at least one other bit from said differential output by detecting a voltage transition in a portion of said symbol stream;

wherein said detecting whether a portion of said symbol stream is within defined voltage regions comprises:

averaging a first portion of said differential output to obtain a first average;

averaging a second portion of said differential output to obtain a second average;

amplifying the difference between said first and second averages to obtain a first and second voltage; and

processing said first and second voltages to determine said at least one bit.

46. (Currently amended) ~~The method of Claim 42,~~ A method for processing transmitted symbols comprising:

receiving a symbol stream and generating a differential output, wherein the symbol stream comprises a plurality of symbols with each symbol uniquely defined by a signal transition and a signal region in a carrier signal, each symbol representing a plurality of data;

determining at least one bit from said differential output by detecting whether a portion of said symbol stream is within a defining voltage region; and

determining at least one other bit from said differential output by detecting a voltage transition in a portion of said symbol stream;

wherein said detecting a voltage transition of a portion of said symbol stream comprises:

- sampling said differential output;
- amplifying the difference between a plurality of samples to obtain a first and second voltage; and
- processing said first and second voltages to determine said at least one other bit.

47-50. (Canceled)